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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------|------------------|
| 10/028,357 | 12/28/2001 | Satoshi Denno | 217776US2 | 3376 |
| 22850 | 7590 | 04/01/2005 | EXAMINER | |
| OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314 | | | TORRES, JUAN A | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2631 | |

DATE MAILED: 04/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | |
|------------------------------|--------------------------------------|---------------------------------------|
| Office Action Summary | Application No. 10/028,357 | Applicant(s) DENNO, SATOSHI |
| | Examiner Juan A. Torres | Art Unit 2631 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 2 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 December 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☒ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) _____ is/are rejected.
- 7) ☒ Claim(s) 1-16 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 December 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 01-23-2004.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: in FIG. 13 references 53-1, 53-2, 53-3 and 53-4, mentioned in page 27 line 23 of the specification. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: in FIG. 24 reference 205. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office

Art Unit: 2631

action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

The drawings are objected to because

- a) In FIG. 17 reference "84-3" is improper. It is suggested to be changed to "84-i-1".
- b) In FIG. 27 reference "231-i" is improper. It is suggested to be changed to "232-i".

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New

Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

The disclosure is objected to because of the following informalities:

- a) In page 22 line 1 the recitation "10-1 - 10-k-1" is improper; it is suggested to be changed to "10-1 - 10-K-1".
- b) In page 23 line 27 the recitation "adder 4" is improper; it is suggested to be changed to "adder 24".
- c) In page 23 line 32 the recitation "adder 4" is improper; it is suggested to be changed to "adder 24".
- d) In page 29 line 7 the recitation " $v_{k,j}(i)$ " is improper; it is suggested to be changed to " $v_{i,j}(k)$ ".
- e) In page 31 line 5 the recitation "84-1 - 84-i" is improper; it is suggested to be changed to "84-1 - 84-i-1".
- f) In page 31 line 28 the recitation "QPSK" is suggested to be changed to "Quadrature Phase Shift Keying (QPSK)".
- g) In page 32 line 31 the recitation "112-1 - 112-4" is improper; it is suggested to be changed to "112-1 - 112-3".
- h) In page 33 line 5 the recitation "136-1 - 136-N" is improper; it is suggested to be changed to "136-1 - 136-K".

i) In page 35 line 5 the recitation "206" is improper; it is suggested to be changed to "216".

j) In page 35 line 15 the recitation " $S_k(i)$ " is improper because it doesn't appear in equation (9).

k) In page 36 line 34 the recitation "two pass Rayleigh" is improper; it is suggested to be changed to "two path Rayleigh".

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: "Multiuser receiving method and receiver".

Appropriate correction is required.

Claim Objections

Claims 1-4 are objected to because of the following informalities: the recitation in line 13 of claim 1 "if ith to Kth" is indefinite; it is suggested to be changed to "when ith to Kth".

Claims 5-8 are objected to because of the following informalities: the recitation in line 13 of claim 5 "if ith to Kth" is indefinite; it is suggested to be changed to "when ith to Kth".

Claims 9-12 are objected to because of the following informalities: the recitation in line 12 of claim 9 "if ith to Kth" is indefinite; it is suggested to be changed to "when ith to Kth".

Claims 13-16 are objected to because of the following informalities: the recitation in line 12 of claim 13 "if i^{th} to K^{th} " is indefinite; it is suggested to be changed to "when i^{th} to K^{th} ".

Appropriate correction is required.

Allowable Subject Matter

Claims 1-16 are allowed over prior art (if the above objections are overcome).

The following is an examiner's statement of reasons for allowance: claims 1-16 are allowed because the references cited fail to teach, as applicant has, a receiving method and apparatus in a receiver demodulating K user signals in a plurality of user signals transmitted on the same communication channel, the receiver comprising K signal extraction parts, a signal estimation part, K joint probability calculation parts and a multiplying part, the receiving method comprising the steps of an i^{th} ($1 \leq i \leq K$) signal extraction part extracting i^{th} to K^{th} user signals, an i^{th} joint probability calculation part calculating a joint probability density function that any signal set in the i^{th} to K^{th} user signals will be obtained if i^{th} to K^{th} user signals estimated by the signal estimation part are assumed to be received, the multiplying part multiplying probability density functions calculated by the joint probability calculation parts so that a multiplied value is obtained, and the signal estimation part estimating first to K^{th} user signals which maximize the multiplied value, and outputting the first to K^{th} user signals to the joint probability calculation parts; and a receiving method and apparatus in a receiver demodulating K user signals in a plurality of user signals transmitted on the same communication channel, the receiver comprising K signal extraction parts, a signal estimation part, K

log likelihood calculation parts and an adding part, the receiving method comprising the steps of an i^{th} ($1 \leq i \leq K$) signal extraction part extracting i^{th} to K^{th} user signals, an i^{th} log likelihood calculation part calculating a logarithm of a joint probability density function that any signal set in the i^{th} to K^{th} user signals will be obtained if i^{th} to K^{th} user signals estimated by the signal estimation part are assumed to be received, the adding part adding logarithms calculated by the log likelihood calculation parts so that an added value is obtained, and the signal estimation part estimating first to K^{th} user signals which maximize the added value, and outputting the first to K^{th} user signals to the log likelihood calculation part, as the applicant has claimed.

Conclusion

This application is in condition for allowance except for the following formal matters:

See above.

Prosecution on the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

A shortened statutory period for reply to this action is set to expire **TWO MONTHS** from the mailing date of this letter.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Schmidl (US 6725025) discloses methods of canceling interference among wireless units communicating with the same base station. Chang (US 5712871) discloses a method and apparatus for implementing a direct-sequence code division multiple access communication system with an M-ary pulse-position


modulated spreading-sequence signal. Shima (US Patent Publication 20020154717) discloses weighting factor setting method for subtractive interference canceller, interference canceller unit using said weighting factor and interference canceller

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Juan A. Torres whose telephone number is (571) 272-3119. The examiner can normally be reached on Monday-Friday 9:00 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad H. Ghayour can be reached on (571) 272-3021. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JAT
3-7-2005



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